CLAIMS

What is claimed is:

1. A minimal contact interface module for minimizing spectral interference during *in-situ* spectral sampling at a tissue measurement site on an arm of a live subject, comprising:

a base having a top surface, a bottom surface and opposing ends, said base defining an aperture that communicates from said bottom surface to said top surface;

an elbow support, said elbow support replaceably attached to said top surface at a first of said opposing ends;

a wrist support, said wrist support replaceably attached to said top surface toward a second of said opposing ends; and

a hand support, said hand support slideably attached to said base at said second of said opposing ends and protruding from said second end;

wherein said arm is received by said interface module so that said arm is supported in a natural position and reproducibly positioned in relation to a fiber optic probe;

wherein said supports minimize contact of the arm with said interface module; and

wherein said interface module is customizable to individual subjects.

2. The interface module of Claim 1, wherein said spectral interference comprises either of:

within sample interference; and

interference between samples.

3. The interface module of Claim 3, wherein said spectral interference results from any of:

variation in placement of said arm in relation to said optical coupling means between samples;

variation in pressure applied by said optical coupling means to said

tissue measurement site within or between samples; and

surface temperature transients at said tissue measurement site, caused by contact of said arm with said interface module within a sample.

4. The interface module of Claim 1, wherein said interface module is positioned during use such that said probe is received by said aperture at said bottom surface and protrudes through said top surface to make contact with said tissue measurement site when said arm is seated in said interface module.

5. The interface module of Claim 1, wherein said elbow support includes a depression that approximately mirrors the shape of an elbow, wherein said elbow is received by said depression when said arm is seated in said interface module, so that said elbow is reproducibly positioned and supported, said elbow support being provided in a plurality of shapes and sizes, according to diameter of said elbow.

6. The interface module of Claim 1, wherein said elbow support further comprises one or more shims for adjusting elbow height, said shim being placed beneath said elbow support, and wherein said shim is provided in a plurality of thicknesses.

7. The interface module of Claim 1, wherein said wrist support provides a surface upon which a wrist is rested during use, so that said wrist is reproducibly positioned and supported, and wherein said wrist support is provided in a plurality of heights and contours.

8. The interface module of Claim 1, wherein said hand support provides a surface upon which a hand is rested during use, so that said hand is reproducibly positioned and supported; and

wherein said hand support is slideably adjustable so that a variety of arm lengths may be accommodated.

9. The interface module of Claim 1, wherein said supports are custom-fabricated for a specific subject.

10. The interface module of Claim 1, said interface being fabricated from one or both of:

one or more thermoplastic polymers; and

one or more elastomeric polymers

11. A minimal contact interface module for minimizing spectral interference during *in-situ* spectral sampling at a tissue measurement site, comprising:

a base having two opposing surfaces and two opposing ends;

a plurality of support elements mounted on said base, wherein said support elements are adapted to receive a member bearing said tissue measurement site so that said tissue measurement site is reproducibly positioned and supported in relation to an optical coupling means, wherein said supports minimize contact of said tissue measurement site with said interface module; and

wherein said interface module is adjustable to individual subjects.

12. The interface module of Claim 11, wherein said spectral interference comprises either of:

within sample interference; and

interference between samples.

13. The interface module of Claim 13, wherein said spectral interference results from any of:

variation in placement of said member in relation to said optical coupling means between samples;

variation in pressure applied by said optical coupling means to said tissue measurement site within or between samples; and

surface temperature transients at said tissue measurement site, caused by contact of said member with said interface module within a

sample.

14. The interface module of Claim 11, wherein said base defines an aperture communicating from a first of said surfaces to a second of said surfaces.

15. The interface module of Claim 14, said optical coupling means comprising a fiber optic probe, wherein said interface module is positioned during use such that said probe is received by said aperture at said first surface and protrudes through said surface to make contact with said tissue measurement site when said member is seated in said interface module.

16. The interface module of Claim 15, wherein said member comprises an arm on a human subject.

17. The interface module of Claim 16, wherein said support elements include one or more of:

an elbow support;

a wrist support; and

a hand support.

18. The interface module of Claim 17, wherein said elbow support is replaceably attached to said top surface at a first of said opposing ends.

19. The interface module of Claim 17, wherein said elbow support includes a depression that approximately mirrors the shape of an elbow, wherein said elbow is received by said depression when said arm is seated in said interface module, so that said elbow is reproducibly positioned and supported.

20. The interface module of Claim 17, wherein said elbow support is provided in a plurality of shapes and sizes, according to diameter of said elbow.

21. The interface module of Claim 19, wherein said elbow support further comprises means for adjusting elbow height

22. The interface module of Claim 21, wherein said means for adjusting elbow height comprises at least one shim, wherein said shim is placed beneath said elbow support, and wherein said shim is provided in a plurality of thicknesses.

23. The interface module of Claim 17, wherein said wrist support is replaceably attached at said top surface of said base toward a second of said two opposing ends.

24. The interface module of Claim 17, wherein said wrist support provides a surface upon which a wrist is rested during use, so that said wrist is reproducibly positioned and supported.

25. The interface module of Claim 17, wherein said wrist support is provided in a plurality of heights and contours.

26. The interface module of Claim 17, wherein said hand support is slideably attached to said base at said second of said opposing ends and protruding from said second end, wherein said hand support is slideably adjustable so that a variety of arm lengths may be accommodated.

27. The interface module of Claim 17, wherein said hand support provides a surface upon which a hand is rested during use, so that said hand is reproducibly positioned and supported.

28. The interface module of Claim 17, wherein said supports are custom-fabricated to a specific subject.

29. The interface module of Claim 11, said interface being fabricated from

one or both of:

one or more thermoplastic polymers; and

one or more elastomeric polymers.

30. A method of minimizing spectral interference during *in-situ* spectral sampling at a tissue measurement site comprising the steps of:

minimizing

variations in placement of a tissue measurement site in relation to an optical coupling means;

minimizing variations in pressure applied by an optical coupling means to said tissue measurement site; and

minimizing surface temperature transients at said tissue measurement site, wherein said temperature transients are caused by contact of said member with a subject interface module;

wherein signal-to-noise ratio is optimized to facilitate net analyte signal detection.

31. The method of Claim 30, wherein said step of minimizing variations in placement of said tissue measurement site comprises reproducibly positioning a member bearing said tissue measurement site in relation to said optical coupling means.

32. The method of Claim 31, wherein said step of minimizing variations in pressure applied by said optical coupling means to said tissue measurement site comprises reproducibly supporting said member in relation to said optical coupling means.

33. The method of Claim 32, wherein said step of minimizing surface temperature transients at said tissue measurement site comprises minimizing contact of said member with said interface module.

34. The method of Claim 33, further comprising the step of providing a minimal contact subject interface module, said subject interface module

comprising:

a base having two opposing surfaces and two opposing ends;

a plurality of support elements mounted on said base, wherein said support elements are adapted to receive said member bearing said tissue measurement site so that said tissue measurement site is reproducibly positioned and supported in relation to said optical coupling means; and

wherein said supports minimize contact of said tissue measurement site with said interface module.

35. The method of Claim 34, wherein said base defines an aperture communicating from a first of said surfaces to a second of said surfaces.

36. The method of Claim 35, said optical coupling means comprising a fiber optic probe, wherein said interface module is positioned during use such that said probe is received by said aperture at said first surface and protrudes through said second surface to make contact with said tissue measurement site when said member is seated in said interface module.

37. The method of Claim 36, wherein said member comprises an arm on a human subject.

38. The method of Claim 37, wherein said support elements include one or more of:

an elbow support;

a wrist support; and

a hand support.

39. The method of Claim 38, wherein said elbow support is replaceably attached to said top surface at a first of said opposing ends.

40. The method of Claim 38, wherein said elbow support includes a depression that approximately mirrors the shape of an elbow, wherein said elbow is received by said depression when said arm is seated in said

interface module, so that said elbow is reproducibly positioned and supported.

41. The interface module of Claim 38, wherein said elbow support is provided in a plurality of shapes and sizes, according to diameter of said elbow.

42. The method of Claim 41, wherein said elbow support further comprises means for adjusting elbow height

43. The interface module of Claim 42, wherein said means for adjusting elbow height comprises at least one shim, wherein said shim is placed beneath said elbow support, and wherein said shim is provided in a plurality of thicknesses.

44. The method of Claim 38, wherein said wrist support provides a surface upon which a wrist is rested during use, so that said wrist is reproducibly positioned and supported.

45. The method of Claim 38, wherein said wrist support is provided in a plurality of heights and contours.

46. The method of Claim 38, wherein said hand support is slideably attached to said base at said second of said opposing ends and protruding from said second end, wherein said hand support is slideably adjustable so that a variety of arm lengths may be accommodated.

47. The method of Claim 38, wherein said hand support provides a surface upon which a hand is rested during use, so that said hand is reproducibly positioned and supported.

48. The method of Claim 38, wherein said supports are custom-fabricated for a specific subject.